CLAIMS

1. A coated implant for *in vivo*-anchoring to a biological tissue or another implant, which coated implant comprises an implant having a pre-treated surface and on said pre-treated surface one or more layers of mainly non-hydrated chemically bonded ceramic material, **characterised in** that each layer of said ceramic material independently comprises a first binder phase selected from the group consisting of aluminates, silicates, phosphates, sulphates and combinations thereof, and that said ceramic material is chemically and/or mechanically bound to said implant.

2. A coated implant according to claim 1, **characterised in** that the first binder phase comprises cations selected from the group consisting of Ca, Sr and Ba.

3. A coated implant according to claim 2, **characterised in** that the cations are Ca-cations.

4. A coated implant according to claim 3, **characterised in** that the first binder phase comprises calcium aluminates.

5. A coated implant according to claim 4, **characterised in** that the first binder phase comprises one or more of the phases $3CaO \bullet Al_2O_3$, $12CaO \bullet 7Al_2O_3$ $CaO \bullet Al_2O_3$, $CaO \bullet 2Al_2O_3$ and $CaO \bullet 6Al_2O_3$.

6. A coated implant according to any of claims 1-5, characterised in that the ceramic material further comprises water-soluble phosphate or a phase (such as a phophate salt) that has the capacity to form water-soluble phosphate.

7. A coated implant according to any of the preceding claims, **characterised in** that said one or more non-hydrated layers have a porosity below 50 %.

8. A coated implant according to any of the preceding claims, **characterised in** that the surface roughness of the pre-treated surface of the implant has a Ra-value of less than 10μm, but not smaller than 0.5 μm.

9. A coated implant according to any of the preceding claims, **characterised in** that the number of layers of the coating is 1-5.

10. A coated implant according to any of the preceding claims, **characterised in** that an innermost layer has a thickness in the interval from nanometer level to less than 10 μm.

11. A coated implant according to any of the preceding claims, **characterised in** that an outermost layer has a surface treated to a surface roughness of $Ra < 20$ μm, but not smaller than 0.5 μm.

12. A coated implant according to any of the preceding claims, **characterised in** that it comprises at least two layers and that each layer outside the innermost one independently has a thickness of less than 50 μm, but not smaller than 5 μm.

13. A coated implant according to any of the preceding claims, **characterised in** that said implant is a medical, orthopaedic or dental implant, such as an artificial orthopaedic device, a spinal implant, a joint implant, an attachment element, a bone nail, a bone screw, and a bone reinforcement plate.

14. A coated implant according to any of the preceding claims, **characterised in** that said implant is of a ceramic, metallic or polymeric material.

15. A coated implant according to claim 14, **characterised in** that said implant material has been selected from titanium, stainless steels, alumina, zirconia and medical grade plastics.

16. A coated implant according to any of the preceding claims, **characterised in** that the implant surface is oxidized.

17. A coated implant according to claim 16, **characterised in** that said oxide is a double oxide of titanate, silicate or aluminate type.

18. A coated implant according to any of the preceding claims, **characterised in** that said mechanical binding to the implant is achieved by sub-micron size crystallites of hydrates precipitated on the surface of said implant.

19. A coated implant according to claim 18, **characterised in** that the crystallite size is less than 100 nm.

20. A coated implant according to any of claims 1-19, **characterised in** that the powdered mainly non-hydrated ceramic material has a particle size of 0.1 to 20 μm.

21. A method of manufacturing a coated implant according to claims 1-20, which method comprises the steps of:

-pre-treating the surface of an implant,

-applying on said pre-treated surface one or more layers of mainly powdered non-hydrated ceramic material, which layers independently comprises a first binder phase selected from the group consisting of aluminates, silicates, phosphates, sulphates and combinations thereof, and

-optionally pre-hydrating said ceramic material by contacting it with a curing liquid or body fluid,

thereby forming a chemical and/or mechanical bond between the ceramic material and said implant.

22. A method according to claim 21, **characterised in** that said pre-treatment is selected from a group consisting of oxidation including low-temperature oxidation, thermal treatment including solid state diffusion and ion bombarding, etching including the use of salt melts, calcination, sand-blasting and grinding.

23. A method according to any of claims 21-22, **characterised in** that the surface roughness of the implant after pre-treatment has a Ra-value of less than 10μm, but not smaller than 0.5 μm.

24. A method according to claim 23, **characterised in** that the innermost layer of the coating is applied on the implant surface by any of the following techniques: thermal spraying, flame spraying, Electro Deposition Spraying (EDS), plasma spraying, dipping and spin coating.

25. A method according to claim 23, **characterised in** that when the surface roughness of the implant has a Ra-value of less than 1μm, but not smaller than 0.05 μm, the innermost layer of the coating is applied on the implant surface by any of the following techniques: Chemical Vapor Deposition (CVD), Physical Vapor Deposition (PVD), laser techniques including laser cladding, Electrolytic Deposition (ED), and sol-gel techniques.

26. A method according to any of claims 25, **characterised in** that when the coating only comprises one layer, said layer is applied using Physical Vapor Deposition (PVD).

27. A method according to any of claims 21-26, **characterised in** that said one or more layers of the coating are thinned, preferably by a process selected from the group consisting of grinding, sand blasting, dry etching and chemical treatment including dissolution.

28. A method according to claim 27, **characterised in** that in connection with said thinning, a partial densification of said one or more layers is performed, preferably by drying up of particles and precipitation including sol-gel techniques.

29. A method according to any of claims 21 to 28, **characterised in** that the pre-hydration is performed by dipping, spraying, spin coating or tape casting the coated implant in/with such an additional hydration liquid.

30. A method according to any of claims 21 to 29, **characterised in** that the powdered, mainly non-hydrated ceramic material, has a particle size of 0.1 to 20 μm.

31. A ceramic paste, **characterised in** that it comprises a powdered calcium-based binder of aluminate and/or silicate and a hydration liquid.

32. A ceramic paste according to claim 31, **characterised in** that it has the form of granules of a size below 1 mm and a granule compaction density above 35 %.

33. A ceramic paste according to claim 32, **characterised in** that the granules have a mean size of at least 30 μm, but 250 μm at the most.

34. A ceramic paste according to any of claims 31-33, **characterised in** that it comprises an organic additive, preferably a hydrophilic polyacrylic and/or polycarboxylate compound.

35. An implantation kit for *in vivo*-anchoring an implant to a biological tissue or another implant, comprising the coated implant according to any of claims 1-20 and optionally a curing liquid capable of hydrating the binder phase of the coated implant and a paste according to any of claims 31-34, wherein the ceramic powder and hydration liquid of the paste are kept separately.